



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/271,609	11/14/2008	William Stanley Hammon III	0336-432/99943	4526

11171 7590 02/02/2017
Patent Portfolio Builders, PLLC
P.O. Box 7999
Fredericksburg, VA 22404

EXAMINER

HE, WEIMING

ART UNIT	PAPER NUMBER
----------	--------------

2612

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

02/02/2017

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Mailroom@ppblaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WILLIAM STANLEY HAMMON, III

Appeal 2016-000118
Application 12/271,609
Technology Center 2600

Before DEBRA K. STEPHENS, JEREMY J. CURCURI, and
KEVIN C. TROCK, *Administrative Patent Judges*.

STEPHENS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134 from a Non-Final Rejection of claims 1–56. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

STATEMENT OF THE INVENTION

According to Appellant, the claims are directed to a seismic data processing system and method, for preprocessing data prior to seismic interpretation, including voxel connectivity mapping, seismic response

reduction, voxel suppression, and voxel density scoring (Abstract). Claim 1, reproduced below, is representative of the claimed subject matter:

1. A computer implemented method for processing seismic data, the method comprising:

receiving a seismic data volume;

determining, with the assistance of a processor, a voxel connectivity score for constituent members of one or more connected features in the data volume, the voxel connectivity score indicating how many voxels make up the constituent members of the one or more connected features in the data volume;

collapsing reflections within the data volume to reduce seismic reflections by reducing minor lobes of a zero phase wavelet, which is associated with a seismic response of a reflector, to a main lobe, wherein the zero phase wavelet includes the main lobe and the minor lobes;

emphasizing high amplitude events using voxel suppression, wherein the voxel suppression uses a running window to determine the voxels in the running window that have values within a specified range of the maximum value in the window;

scoring the local significance of data trends in the seismic data volume; and

saving an output data volume, wherein, in the output data volume, one or more insignificant features have been removed.

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Crawford	US 5,987,388	Nov. 16, 1999
Sen	US 2002/0118602 A1	Aug. 29, 2002
Dunn	US 2004/0062145 A1	Apr. 1, 2004
Borgos	US 2004/0260476 A1	Dec. 23, 2004
Kouri	US 7,272,265 B2	Sept. 18, 2007

REJECTIONS

Claims 16–23 and 44–51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunn and Sen (Non–Final Act. 6–11).

Claims 27, 28, 55, and 56 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunn and Crawford (Non–Final Act. 11–14).

Claims 1–9, 13–15, 29–37, and 41–43 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunn, Crawford, and Sen (Non–Final Act. 14–24).

Claims 24–26 and 52–54 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunn, Crawford, and Kouri (Non–Final Act. 24–27).

Claims 10–12 and 38–40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunn, Crawford, Sen, and Borgos (Non–Final Act. 27–29).

We have only considered those arguments that Appellant actually raised in the Briefs. Arguments Appellant could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2012).

ISSUES

35 U.S.C. § 103(a): Claims 1–9, 13–15, 29–37, and 41–43

Appellant contends the invention as recited in claims 1–9, 13–15, 29–37, and 41–43, is not obvious over Dunn, Crawford, and Sen (App. Br. 12–20). The issues presented by the arguments are:

Issue 1: Does the combination of Dunn, Crawford, and Sen teach, suggest, or otherwise render obvious:

determining, with the assistance of a processor, a voxel connectivity score for constituent members of one or more connected features in the data volume, the voxel connectivity score indicating how many voxels make up the constituent members of the one or more connected features in the data volume; [and]

collapsing reflections within the data volume to reduce seismic reflections by reducing minor lobes of a zero phase wavelet, which is associated with a seismic response of a reflector, to a main lobe, wherein the zero phase wavelet includes the main lobe and the minor lobes,

as recited in claim 1?

Issue 2: Has the Examiner improperly combined the teachings and suggestions of Dunn, Crawford, and Sen?

ANALYSIS

Issue 1:

Appellant summarizes both Dunn and Crawford, and asserts neither one teaches or suggests “using a zero phase wavelet that includes a main lobe and minor lobes and a step of collapsing reflections within the data

volume to reduce seismic reflections by reducing the minor lobes of the zero phase wavelet to the main lobe” (App. Br. 12–15). More specifically, Appellant contends although Dunn teaches various traces having peaks and troughs, Figures 4–6 of Dunn do not disclose a zero phase wavelet “symmetric about the maximum reflection lobe” (App. Br. 14–15). Appellant further argues Crawford teaches adjusting a pixel of interest’s intensity and based on the adjusted intensity, removing “single pixel-wide stripes” but fails to teach using a zero phase wavelet as recited in claim 1 (*id.* at 15).

Appellant’s arguments directed to Dunn and Crawford individually, are not persuasive as the Examiner relies on each of Dunn and Crawford as teaching the disputed limitation except for “a zero phase wavelet” for which the Examiner relies on Sen as teaching (Non-Final Act. 18).

Appellant next contends Sen teaches removing multiples from recorded seismic data because multiples hide primaries (“a wave that propagates from a source to a receiver with a single reflection on a reflector of interest”) (App. Br. 16). According to Appellant, waves having multiple reflections are called multiples (*id.*). Appellant argues Sen teaches “[f]or comparison with the original data, the result has been convolved with a zero phase wavelet” (*id.*) (emphasis omitted) but fails to teach whether: minor lobes of the zero phase wavelet are reduced; the zero phase wavelet is associated with a seismic response of a reflector; or reflections are collapsed to a main lobe, as recited in independent claims 1 and 29 (*id.* at 17). More specifically, Appellant contends Sen teaches comparison of results of a new method with original data, the result of the new method having been convolved with a zero phase wavelet (*id.* (citing Sen ¶ 52)).

However, the Examiner relies on Sen to teach the zero phase wavelet and finds “the filtering process of Dunn can be modified to apply a zero phase wavelet of Sen to reduce minor lobes (i.e.,] 47 or 45) and maintain the main lobe (i.e.,] 46a)” (Ans. 3). In the Reply Brief, Appellant further argues Dunn refers to “troughs” and, thus, does not disclose major and minor lobes (Reply Br. 2). However, the Examiner relies on Sen’s zero phase wavelet having a main and minor lobes (Ans. 2–3). Therefore, Appellant has not persuaded us of error in the Examiner’s findings.

Next, Appellant argues the zero phase wavelet is not part of the data volume (Reply Br. 3). Appellant has not defined explicitly “data volume” in the claim or in their Specification. Moreover, Appellant has not proffered sufficient evidence to persuade us the Examiner’s interpretation is in error. We agree with the Examiner and find Sen describes attenuating original data to achieve a result which has been convolved with a zero phase wavelet (Ans. 2–3; Sen ¶ 52). Thus, the zero phase wavelet “is associated with a seismic response of a reflector.”

Appellant further argues Dunn’s reasons “for rejecting elements 45 and 47 are not because they are associated with minor lobes of a zero phase wavelet, but rather because they do not meet certain criteria introduced by Dunn” (Reply Br. 4). We are not persuaded by Appellant’s arguments for the reasons set forth by the Examiner and, moreover, because Appellant’s argument is directed to Dunn individually when the Examiner has relied on Sen as teaching the zero phase wavelet (Ans. 2–3). Further, we note the claim does not recite particular steps used in “collapsing reflections within the data volume.”

Appellant additionally argues none of the references teach “a voxel connectivity score” (App. Br. 18). According to Appellant, Dunn fails to teach the disputed limitation because the method in Dunn is different than the recited method and further, in Dunn, all the voxels are making up the trace and, thus, no need exists to calculate the score (*id.* at 20).

We are not persuaded by Appellant’s arguments. The claim does not specify the particulars of determining the voxel connectivity score, nor is the voxel connectivity score used. Instead, the claim merely requires determining the score. Furthermore, paragraph 58 of Appellant’s Specification, to which Appellant points as disclosing this feature, also does not specify the particulars of determining the voxel connectivity score (App. Br. 2; Spec. ¶ 58). As such, Appellant has not persuaded us the Examiner’s findings (Ans. 4–5) are in error.

Issue 2:

Appellant’s assertion that the Examiner’s reason for combining the teachings and suggestions of Dunn and Crawford “is confusing” (App. Br. 18), is not persuasive. Appellant has not proffered sufficient argument or evidence to persuade us of error. The Examiner has set forth reasoning with some rational underpinning (Ans. 3–4; Non-Final Act. 18), specifically:

the combination of Dunn and Crawford teaches the voxel suppression by using a running window to filter the insignificant features [(noise)] from the desired significant features [(reflections)] and associate the voxels with the local maximum value with the feature. Here, the insignificant features refer to a noise to the desired feature (i.e., [reflections]).

(Ans. 3–4). Appellant merely states the Examiner’s reasoning is confusing because “[i]t is not clear what is (i) a voxel with the local maximum value,

(ii) the feature, and (iii) how the association of a ‘voxel’ with ‘a local maximum value’ with a ‘feature’ eliminates ‘insignificant features’” without any further elaboration (App. Br. 18). However, we find the Examiner has articulated reasoning with some rational underpinning. Thus, Appellant has not persuaded us the Examiner has improperly combined the teachings and suggestions of Dunn, Crawford, and Sen.

Accordingly, Appellant has not persuaded us the combination of Dunn, Crawford, and Sen fails to teach, suggest, or otherwise render obvious the limitations as recited in independent claim 1, independent claim 29, and dependent claims 2–9, 13–15, 30–37, and 41–43, not separately argued. Therefore, we sustain the rejection of claims 1–9, 13–15, 29–37, and 41–43 under 35 U.S.C. § 103(a) for obviousness over Dunn, Crawford, and Sen.

35 U.S.C. § 103(a): Claims 16–23 and 44–51

Appellant contends the invention as recited in claims 16–23 and 44–51, is not obvious over Dunn and Sen (App. Br. 21–22). The issue presented by the arguments is:

Issue 3: Has the Examiner erred by improperly combining the teachings and suggestions of Dunn and Sen?

ANALYSIS

Appellant’s first two arguments, that Dunn and Sen fail to teach “collapsing reflections” by reducing minor lobes of a zero phase wavelet and “a voxel connectivity score” (App. Br. 21) are not persuasive for the reasons set forth above with respect to claim 1.

Appellant further argues the Examiner's articulated reason for combining the teachings of Dunn and Sen "is confusing" (App. Br. 21). Appellant specifically asserts it is unclear in Dunn, what the "attenuated signal" that needs to be removed is (*id.* at 22). Additionally, Appellant contends Sen's paragraph 52, indicates two different sets of data needing to be compared (*id.*).

The Examiner finds it would have been obvious to combine the teachings and suggestions of Dunn with the teaching of Sen "so as to remove the attenuated signal to preserve the primary reflections to make it strongly visible in the original data" (Non-Final Act. 8). In paragraph 52, to which the Examiner points, Sen teaches "the multiples have been attenuated, and more importantly, the primary reflections, which are marked by arrows have been preserved" (Sen ¶ 52). Sen further teaches the primary reflections will be more visible as a result (*id.*). Thus, Appellant's assertion regarding Dunn is not persuasive as the Examiner relies on the combination of Dunn and Sen and specifically, Sen's removing the attenuated signal (multiples) to preserve the primary reflections to make it strongly visible. Thus, we determine the Examiner has articulated reasoning with some rational underpinning as to why the teachings and suggestions of would have been combined by an ordinarily skilled artisan.

Accordingly, Appellant has not persuaded us the combination of Dunn and Sen fails to teach, suggest, or otherwise render obvious the limitations as recited in independent claim 16 and in independent claims 21, 44 and 49, not separately argued and further, in dependent claims 17–20, 22, 23, 45–48, 50, and 51, not separately argued. Therefore, we sustain the rejection of claims

16–23 and 44–51 under 35 U.S.C. § 103(a) for obviousness over Dunn and Sen.

35 U.S.C. § 103(a): Claims 27, 28, 55, and 56

Appellant contends their invention as recited in claims 27, 28, 55, and 56, is not obvious over Dunn and Crawford (App. Br. 23–24). The issue presented by the arguments is:

Issue 4: Does the combination of Dunn and Crawford teach, suggest, or otherwise render obvious “convolving the seismic data volume with an operator” and “for each position of the operator, scoring the local significance of data trends in the seismic data volume by counting a number of voxels within a given threshold range in a running window,” as recited in claim 27?

ANALYSIS

Appellant summarizes the portion of Dunn relied upon by the Examiner and contends “neither paragraph discloses convolving the seismic **data volume** with an **operator**” (App. Br. 23). Appellant has not persuaded us of error in the Examiner’s findings and reasoning (Non-Final Act. 11–13; Ans. 5–7). In the Reply Brief, for the first time, Appellant contends neither reference discloses an “operator” as “one skilled in the art of seismic processing, would know that an operator is a mapping from one vector space to another” (*id.* at 6) without providing evidence to show an ordinarily skilled artisan would have interpreted the term as proffered, at the time of the invention. Thus, Appellant has not persuaded us the Examiner’s interpretation of “operator” is in error.

Appellant additionally argues Dunn and Crawford do not teach or suggest scoring the local significance of data trends in the seismic data volume (App. Br. 23–24). Appellant identifies the paragraphs of Dunn relied on by the Examiner and contends none of them discloses an operator or the recited scoring and further, “the correlation window 130 is not used to count a number of voxels” (App. Br. 24).

Appellant has not proffered sufficient evidence or argument to persuade us the Examiner’s findings (Non-Final Act. 11–13; Ans. 5–7) are in error. Appellant’s argument that Dunn’s correlation window is not used to count a number of voxels is not persuasive as Dunn teaches a running window may be a time window (Dunn ¶ 59) and the Examiner determines “the method of Dunn can be modified to count the number of voxels in a running window” (Non-Final Act. 12). Moreover, the Examiner further relies on Crawford, which Appellant has not addressed (*id.*). Indeed, the Examiner has set forth with specificity where the relied upon references teach, suggest, or otherwise render obvious the disputed limitations while Appellant has not provided sufficient argument or evidence to persuade us the Examiner’s findings are in error.

Accordingly, Appellant has not persuaded us the combination of Dunn and Crawford fails to teach, suggest, or otherwise render obvious the limitations as recited in independent claim 27. Commensurately recited independent 55 and dependent claims 28 and 56 were not separately argued; therefore, these claims fall with claim 27. It follows, we sustain the rejection of claims 27, 28, 55, and 56 under 35 U.S.C. § 103(a) for obviousness over Dunn and Crawford.

35 U.S.C. § 103(a): Claims 24–26 and 52–54

Appellant contends their invention as recited in claims 24–26 and 52–54, is not obvious over Dunn, Crawford, and Kouri (App. Br. 25–29). The issue presented by the argument is:

Issue 5: Does the combination of Dunn, Crawford, and Kouri teach, suggest, or otherwise render obvious “the voxel suppression convolves in a running window an operator with the seismic data volume,” as recited in claim 24?

Issue 6: Has the Examiner improperly combined the teachings and suggestions of Dunn, Crawford, and Kouri?

ANALYSIS

Appellant contends Dunn does not reference any operator and further, does not disclose “a maximum value of the running window and determining voxels in the running window that have values within a range of that maximum value” (App. Br. 25). Appellant additionally asserts Crawford does not use the term “operator” nor “convolving” in the cited paragraphs (*id.* at 26). As set forth above with respect to claim 27, Appellant’s arguments directed to Dunn regarding “operator” and “running window” are not persuasive.

Appellant’s additional arguments directed to Crawford are not persuasive (App. Br. 26). Although Appellant argues the Examiner’s interpretation of “operator” as “any mathematical operation” is in error because “an operator has a well-established meaning in the art” (*id.*) is not persuasive because Appellant has not proffered sufficient evidence or argument to persuade us the Examiner’s interpretation is in error. Moreover,

the Examiner has set forth with particularity, the basis of the rejection (Non-Final Act. 24–26; Ans. 8–9). Appellant contends each reference, individually does not teach the disputed limitation, but Appellant has not proffered sufficient evidence or argument to persuade us the Examiner’s findings that the combination of Dunn and Crawford teaches the disputed limitation, are in error.

Appellant next contends the Examiner’s articulated reasoning for combining Dunn and Crawford is confusing for the reasons set forth with respect to claim 1 (App. Br. 26). For the reasons set forth above, we are not persuaded by Appellant’s assertion.

Appellant additionally contends Kouri fails to teach “sorting a portion of the voxels by absolute value,” as recited in claim 24 (App. Br. 26). Appellant contends Kouri does not “introduce the idea of (i) an operator or (ii) sorting a portion of voxels for an operator position or (iii) using the absolute value for sorting” (*id.* at 27). Thus, according to Appellant, Kouri is unrelated to “sorting a portion of the voxels by an absolute value for an operator position” (*id.*). Again, Appellant has provided no detail as to why Kouri fails to teach the disputed limitation and more particularly, has not addressed the Examiner’s detailed findings that the combination of Dunn and Kouri teaches, suggests, or otherwise renders obvious “sorting a portion of the voxels by absolute value” (Non-Final Act. 24–26; Ans. 8–9).

Lastly, Appellant argues the Examiner has not set forth why an ordinarily skilled artisan would have found it obvious to combine the teachings and suggestions of Dunn, Crawford, and Kouri and furthermore, the conclusion — “to prepare the image data for following trim filtering process” — lacks reasoning (App. Br. 28). Moreover, Appellant asserts

because Dunn discloses “how to trim some voxels when there are too many associated with a trough,” the Examiner has not shown why Dunn needs the technique disclosed by Kouri (*id.* at 28–29).

We determine the Examiner has articulated reasoning with some rational underpinning:

The operation of a running window of Dunn and Crawford can be further modified by the teaching of Kouri to perform a sorting operator in a running window in favor of following operator(s) on the seismic data in the running window, for example, filtering or trimming the insignificant signals or noises based on the result of sorting or comparing operator

(Ans. 10; Final Act. 26). Appellant has not proffered sufficient evidence or argument to persuade us of error in the Examiner’s findings and reasoning and instead, contend the motivation is confusing (Reply Br. 7). Thus, we are not persuaded the Examiner improperly combined the teachings and suggestions of Dunn, Crawford, and Kouri.

Accordingly, Appellant has not persuaded us the combination of Dunn, Crawford, and Kouri fails to teach, suggest, or otherwise render obvious the limitations as recited in independent claim 24 and in dependent claims 25, 26, and 52–54, not separately argued. Therefore, we sustain the rejection of claims 24–26 and 52–54 under 35 U.S.C. § 103(a) for obviousness over Dunn, Crawford, and Kouri.

DECISION

The Examiner’s rejection of claims 16–23 and 44–51 under 35 U.S.C. § 103(a) as being unpatentable over Dunn and Sen is affirmed.

The Examiner's rejection of claims 27, 28, 55, and 56 under 35 U.S.C. § 103(a) as being unpatentable over Dunn and Crawford is affirmed.

The Examiner's rejection of claims 1–9, 13–15, 29–37, and 41–43 under 35 U.S.C. § 103(a) as being unpatentable over Dunn, Crawford, and Sen is affirmed.

The Examiner's rejection of claims 24–26 and 52–54 under 35 U.S.C. § 103(a) as being unpatentable over Dunn, Crawford, and Kouri is affirmed.

The Examiner's rejection of claims 10–12 and 38–40 under 35 U.S.C. § 103(a) as being unpatentable over Dunn, Crawford, Sen, and Borgos is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED